ON THE

CURE OF

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POPLITEAL ANEURISM,

BY PRESSURE AT THE GROIN.

BY

J. M. O'FERRALL, M.D., M.R.I.A.,

FELLOW OF THE ROYAL COLLEGE OF SURGEONS, V. P. OF THE PATHOLOGICAL SOCIETY, AND FIRST MEDICAL ADVISER TO ST. VINCENT'S HOSPITAL.

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ON THE

CURE OF POPLITEAL ANEURISM.

The following clinical researches appear to shew, 1st, The superiority of *pressure at the groin*, in comparison with that applied in other situations, for the cure of Popliteal Aneurism ; 2nd, That different and even *opposite methods of constitutional treatment* are required in different cases ; and, 3rd, That certain *auxiliary means* may promote, in a material degree, the successful issue of the case.

Popliteal aneurism ; compression at different parts of the artery; cure in thirty-three days.—A labourer in the Ballast department, named Cullen, thirty-two years of age, and of a healthy, brown complexion, was admitted into St. Vincent's Hospital in June, 1845. The report of that date states that he is married, and has three children, all of whom are healthy. He has always enjoyed good health, although he was formerly very intemperate in the use of ardent spirits. For the last five years, however, he has been a strict member of the Temperance Society.

Three weeks ago, while in the act of raising a heavy stone, he felt something break in his left ham. For some time subsequently he experienced no inconvenience, except a little stiffness in the joint, which was always removed by exercise. Three days ago he perceived a pulsating swelling in the ham ; this gave him a shock, and he has been nervous about it since.

The following was the condition of the parts on admission ; The left popliteal space was filled by a large, visibly pulsating tumour ; the expansion of which is felt laterally between the tendons of the hamstring muscles. A very

slight pressure on the femoral artery obliterates the pulsation in the tumour, which then becomes flaccid and empty. There is a *fremissement* to the touch, at the upper part of the swelling; and all over its surface, but most distinct at its external edge, a well marked *bruit de soufflet*. The integuments of the leg are slightly discoloured, and the superficial veins evidently enlarged. When standing erect he rests upon the outer edge of the foot of the affected side, and the heel is raised about half an inch from the ground. The arteries of the foot cannot be distinctly traced. On examining the heart, the first sound is long, and along the aorta is rather rough; impulse feeble compared with that of the artery at the wrist: the sounds of the heart very audible along the right sides of the chest. Tongue clean; urine normal; skin hot; pulse 90, full and jerking; but these characters are not increased by elevating the arm. Ordered to be bled twelve ounces, and to take ten drops of tincture of digitalis three times a day.

June 25th.—Pulse 84, full and jerking; skin cool: feels more comfortable, and has slept.

The instrument is applied above the middle of the thigh. The superficial veins immediately became very much distended, and the whole limb assumed a purple colour. In half an hour the temperature of the foot was sensibly lower than that of the other side. The pulsation in the tumour was rendered very feeble. The pressure was now relaxed, and the parts allowed to rest; the limb was elevated on an inclined plane. The superficial vessels nearly disappeared, and the instrument was re-applied, so as to lessen, but not obliterate, the pulsation in the tumour. The superficial veins swelled considerably, but certainly much less than when the limb was horizontally placed; he stated also that he felt less numbness in this posture. The temperature of the foot, which is wrapt in wool, is hardly lower than that of the other.

June 30th.—From the date of the last report the daily

occurences have varied little; the curve of the instrument has been altered. After an hour or two, the counterplate of the instrument was found to have rolled, and the pulsation to have returned in full force. The instrument was re-adjusted, but the same displacement occurred again. The veins of the leg, however, are not now swollen, nor is the whole of the limb rendered so full while the pressure is kept up. This day a long splint was applied on the outside of the thigh: over this, the plate of counter-pressure was laid, and the pressing screw arranged as before. The patient expressed himself much relieved by this plan, which divided the pressure along the whole outside of the thigh.

July 1st.—The instrument has been again altered, and maintains its position longer now than before the splint was applied; it still, however, becomes displaced after some time. The size of the tumour is manifestly diminished.

July 10th.—The pulsation still returns occasionally, but in less force, and the dimensions of the tumour are lessening. He was directed to keep a weight of three pounds over the artery in the groin, as long as he found no inconvenience from it; he at once said he could bear it very well, and it commanded the artery perfectly. The instrument below was relaxed; two pulsating vessels, one at each side of the knee, are beginning to be felt.

July 20th.—The substance of the daily reports is, that the pressure, sometimes at the groin by the weight, sometimes lower down by the instrument, is found to restrain the pulsation for a longer time than before, and that when it returns it is less vigorous. The size of the tumour is reduced by one-half; when the pulsation is completely prevented it feels very small and solid. The action of the weight at the groin is preferred by the patient, as he can keep it in its place with his hands, and it creates less annoyance than the instrument.

July 28th.—He says he kept the weights on all night; there is no pulsation in the tumour this morning when the

pressure is removed. Tumour in the ham is reduced to the size of a walnut; a small vessel is felt pulsating along its surface; but there is no movement at either side of this slender branch.

From this time he went on well, and was soon allowed to sit up. The tumour progressively diminished in size, and, when he left the hospital in September, it was scarcely to be traced as a small, firm cord. The small branch alluded to could be felt lying loosely over it.

At this time his health was tolerably good, for he had been allowed a generous diet early in the treatment, on account of feeling very nervous and losing sleep. The digitalis had also been soon discontinued for the same reason. When leaving the hospital the femoral artery on that side could be felt less vigorous than the other as far down as the beginning of the lower third of the thigh, where it was lost. No trace of the anterior or posterior tibial arteries could be discovered; he could extend the limb and walk with tolerable ease. The roughness along the aorta was no longer perceptible: his pulse was 80, full, and not jerking as before.

Popliteal aneursim; compression of the groin; cured in eleven days.—Christopher Delany, a labourer, thirty-seven years old married; admitted into St. Vincent's Hospital, April, 1846, with extreme pallor of the face, and all the physical signs of anæmia are easily detected; his habits were formerly intemperate. He states that up to the date of his present complaint he always enjoyed good health. About twelve months ago he was seized with severe pain in the back and hips, which he ascribed to cold: but it did not prevent him from attending to his labour in a chemical factory. About December last the pain became much more severe, and occasioned such a degree of weakness in his legs, as to cause him frequently to tremble on his knees while rolling a heavy barrow. He obtained medical advice from several sources, and was cupped, leeched, blistered, and had warm baths, but all without relief. From this time he suffered from increase of debility, with palpitation

of the heart. His attention was now directed to what he called a kernel, situate in the ham of the right leg, for the exact origin of which he could not account. It was discovered that he had a pulsating tumour, and he was then sent to this hospital.

On admission he complained of a severe and constant pain in the back, extending to both loins, and most severe at night. On examining the right leg, a pulsating tumour about the size of a hen's egg was found in the popliteal space. Pressure on the tumour rendered it quite flat, but on relaxing the pressure, it refilled with a distinct diastolic pulsation. The stethoscope applied over the swelling, detected a well-marked bellows murmur; on compressing the femoral artery at the groin, the pulsation ceases, and the tumour becomes flaccid. There was no evidence of abdominal tumour. His skin was cool, pulse rather feeble, and about 80; he was nervous and anxious. There was no difficulty in the diagnosis, which was confirmed by the opinions of Dr. Wilmot and others.

After the exhibition of mild aperients he was directed to take three grains of extract of hyosciamus at night, and five grains of the saccharated proto-carbonate of iron three times a-day.

On the 21st of April the new pelvic instrument, to be hereafter described, and consisting of a concave iron thigh-plate, from which the curved arm, supporting the screw in front, was made to spring, was applied, and the femoral artery was compressed against the pubis, but with very little force. No pain or venous turgescence followed this process. Just as the screw was about to be tightened, pressure was made below the aneurismal sac with the fingers, and maintained for about a minute, thus keeping the sac in a distended state; the pressure at the groin was next slightly relaxed, so as to admit a very feeble current through the vessel, and he was allowed to rest. This condition remained unaltered for about two hours, when the pulsation in the sac

was found to have returned. A turn or two of the screw restored the parts to their quiescent state.

April 24th. Hardness of the tumour is distinctly perceptible, and the force and extent of the pulsation is obviously lessened in it. The dose of Iron was increased. From this time matters went on improving until the 3rd of May, when the report states that all diastolic pulsation had ceased. A narrow line of filiform pulsation had become perceptible along the surface of the tumour, giving the impression to the finger as if a slender stream still passed through the proper channel of the artery. The tumour was quite firm, and reduced to one-half its original size. The instrument was now finally removed; the contents of the sac being evidently solidified, and it was deemed unnecessary to continue any further restraint upon the circulation.

The patient remained in hospital until the fifth of June, having been for some time before allowed to walk about and use the limb. The dose of iron had by this time reached 45 grains, three times a day. His lumbar and dorsal pains had nearly altogether disappeared, and his health was much improved. The tumour at this time was reduced to the size of a small almond kernel; the filiform pulsation was still perceptible, but he had full use of the limb.

On the 20th of July this patient was brought to the hospital again for examination, which was made with the assistance of Doctor E. Hartshorne, of Philadelphia, and in the presence of several of the pupils. His general health had continued to improve; the physical signs of the anæmic condition were still perceptible; the pain in his back was latterly felt, but in a very slight degree. His occupation in a chemical factory is laborious and unhealthy, obliging him frequently to sit up the entire night. On examining the limb, the femoral artery was distinctly traceable to the lower extremity of the middle third of the thigh. In the ham the same minute filiform pulsation was perceptible. In the original situation of the tumour there was now only a narrow induration, about

the size of a goose quill; no trace of the anterior or posterior tibial arteries could be detected. A small twig could be felt running transversely over the inner condyle of the femur.

OBSERVATIONS.

It will be remarked that, in the phenomena and circumstances of those instances, there are certain points of difference; there is also an important difference in their medical treatment, as well as in the mechanism and point of application of the compression. A short analysis of the cases, in these their practical relations, will, perhaps, be interesting to those who are inclined to adopt the safest of the methods yet proposed for the cure of popliteal anuerism.

In the case of Cullen, the history of the production of the aneurism, was favourable to the hope that the arterial system might be otherwise free from disease. His employment as a heaver of ballast exposed the limb of the affected side to the consequences of repeated flexion, followed by sudden and forcible extensions, and this more than a thousand times daily. In ordinary, the right leg, is that used for this effort; Cullen was left-handed, and therefore employed the left leg in the manner described.

His general state was that of vacular excitement; his healthy brown colour afforded no grounds for supposing the blood to be in a morbid state; but the peculiar jerking pulse could not fail to direct attention to the central organs. It was the kind of pulse, which, when found in connexion with an external aneurism, has been called by surgeons the aneurismal pulse, but which is in reality, often the symptom of an undiscovered lesion of the aortic valves. A very careful physical examination of Cullen's chest, however, left no doubt on my mind as to the condition of the heart; there was no evidence of disease in that organ, and its sounds and impulse were actually feeble in comparison with the arterial pulse. The disturbance was principally in the arterial system, and when connected with the hot skin, suggested, if not the dia-

gnosis of an arteritis, at least the propriety of venesection, and a short course of digitalis.

In this case the various instruments were applied at points below the origin of the profunda. Each application of the pressure was followed by venous congestion of the entire limb, and, at first, by numbness and decrease of temperature. These phenomena gradually gave place to those of a new circulation, but the duration of the treatment extended to thirty-three days.

I examined this patient in the month of August last (twelve months after the cure), in the presence of the class. His health was excellent; he had practised and acquired the use of the right hand, and could use either indifferently, so as to rest the opposite limb. The aneurismal limb was quite healthy in appearance; the ham was not fuller than the opposite. Careful and deep pressure gave the idea of a thickening about half an inch long in the former situation of the aneurism. The femoral artery was perceptible to the middle of the thigh, where it was lost. No pulsation could be detected in the situation of the anterior or posterior tibial arteries, a fact, it will be remembered, observed on his admission into hospital. A small twig crossing the ham, and another over the inner condyle, were all that could be traced; there was no abnormal sound in the aorta or heart.

In the case of Delany, some of the phenomena were different from those of Cullen. Delany was pale and anæmic in appearance; there was no heat of skin; he complained of palpitations, but there was no evidence of cardiac disease, while the physical signs of anæmia were distinctly marked: he was therefore put at once on a chalybeate treatment. The long persistent neuralgia of the lumbar region led to a careful scrutiny of the abdominal aorta, but no sign of aneurism could be detected there. In this case the pressure was applied at one point only, and that very high up, near Poupart's ligament. The construction of the instru-

ment was altogether different from that usually employed. Very little force was required to compress the artery, and no venous turgescence ensued. The cure was established on the twelfth day.

The value of constitutional measures in such cases is not sufficiently insisted on, and yet I believe it will be found an important element in the treatment. If it were made a rule to institute a course of digitalis, with low diet in every instance, as an aid to the compression, I apprehend that mischief would be frequently done, and the cure of the aneurism retarded. The cases here related may be regarded as examples of two very different classes of patients labouring under aneurism, and requiring medical treatment of a very opposite description. The blanched and anæmic Delany would have been as improperly treated by digitalis and venesection, as the brown and plethoric Cullen would have been by the preparations of iron. Both presented evidence of disturbance in the arterial system, but the cause of that disturbance was clearly aggravated in the one case by a morbid condition of the blood, and in the other by an irritation in the vessels themselves, approaching to the character of arteritis. The indications, then, were different and opposite, and in either case were justified by the results of the medication employed.

The principle upon which the impediment to the current through the artery is to be effected has been long since laid down by the late Professor Todd, and is now generally adopted in this country; the circulation is to be moderated but not suddenly arrested, and time is to be allowed for the establishment of a collateral circulation. The history of this practice is well described in the last Number of this Journal, in an interesting paper by Mr. Wilde. The claims of the different operators to the several modifications of the apparatus being there so well and so recently stated, I have thought it unnecessary to reiterate them in this place.

The exact point of its course, in which it is best to make compression on the artery, seems to be still unsettled. In Dr. Harrison's case much relief was obtained by shifting the pressure from one part of the vessel to another. This expedient is rendered necessary by the pain experienced from the continued pressure on one point, and by the contusion or fretting of the superincumbent parts, which generally results from the instruments in common use. The integuments do not bear well the force required to compress the artery. These inconveniences resulted from a two-fold defect in the instrument: 1st, the impossibility of regulating the angle of incidence of the compressing force; and 2ndly, the want of a steady and undeviating point of counter-pressure. Both these defects are remedied by Mr. Read's instrument, to be presently described.

But, admitting that we are in possession of an instrument by which compression may be effected without injury, or even without great inconvenience to the patient, is it a matter of indifference at what point the pressure should be made?—or may its locality be changed from one point to another, without any physiological difference in the result? I was led to this consideration by remarking that venous turgescence ensued in very different degrees in different cases, and that this congestion seemed to bear some relation to the distance from Poupart's ligament, at which the pressure was applied. In Cullen's case, for instance, the force was applied at different points of the artery, below the origin of the profunda, and turgescence of the superficial veins ensued to a degree imparting a purple hue to the swollen limb. In Delany's case, on the other hand, the force was applied at one point only, just below Poupart's ligament, and no venous congestion was remarked.

In considering the anatomy of the parts, it appears very probable, that when compression is made high up, the vein may be avoided, while such an exemption would be quite impossible lower down, where the vein slips behind the

artery, and must of necessity receive its share of the pressure. The possibility of avoiding the vein, while compressing the artery at the groin by the finger, may be ascertained by any one who takes the trouble to make the experiment with care. I have demonstrated this repeatedly to the class, and shewn the alternate interruption to the current through the artery, and the turgescence of the saphena, made at will, according as the finger was shifted from one vessel to the other. The experiment was then made with Read's instrument, and the artery compressed by placing a narrow compress of lint, with adhesive plaster, along its course at the groin, and thus guiding the pad of the screw to the proper point, without any interruption to the current through the vein.

The only objection to making the pressure high up, is the interference with the profunda artery. This might be a fair objection, if the practice was to interrupt the current suddenly and completely, as is done when the ligature is applied. But it can have little weight, when we consider that the passage of the blood is moderated, but not suppressed, at first, and that even when the cure is effected, the blood pursues its usual course for some distance down the thigh.

Another reason for making the pressure high up and avoiding the vein, is afforded by experience. In a case lately dissected, I have been assured by Dr. O'Brien (see Appendix,) that the vein compressed, together with the artery in Scarpa's space, was found thickened for about three inches of its length. It had acquired the solidity and thickness of an artery at this place, and retained its patulous circular figure on section. Thus a local phlebitis had followed the application of the pressure at this place, and with our knowledge of the insidious nature of phlebitis, however limited at first, we should not underrate this pathological reason, in addition to those already adduced, for preferring

pressure at the groin, where, with some little care, it is possible to confine it to the artery.

It is obvious to the least reflection, that effectual pressure at the groin cannot be made in the direction of a line dropped perpendicularly to a limb in the horizontal position. It must be made in a direction upwards and backwards in order to compress the artery against the pubis. And as the angle at which this force is to be directed will change with every new subject, or in the same subject at different times, it becomes necessary to devise a power of altering the inclination according to circumstances. This power is afforded by Mr. Read's ball and socket joint, while the quadrant adjacent to it admits of the removal of this joint to a suitable position from which it is to act.

Much pains have been bestowed upon the mechanism of the splint plate, which was to lie at the back of the thigh, and to give origin to the arch of the instrument, as well as to support the limb. This counter-plate or splint was made short or long, and the surface was curved or angular; but it was still found to roll upon the limb, and consequently to displace the pad or compress upon the vessel. I have long thought that the pelvis was the only suitable *point of support* for the instrument, and that any contrivance which attempted to derive this support from the thigh, or to compress the artery towards or against the femur, would be liable to delay or disappointment. Read's instrument fulfils this intention admirably. It deserts the always moveable femur as a point of support, and grasps the pelvis firmly in the manner of the hernia truss. If to this principle of making the pelvis the counterpoint, be added the plan I propose, and which succeeded in eleven days in the case of Delany, of making the pelvis always the point against which the artery is to be pressed, and thus avoiding the vein, we shall, I believe, have the fullest advantage derivable from mechanical aid. This arrangement renders the operation of the instrument

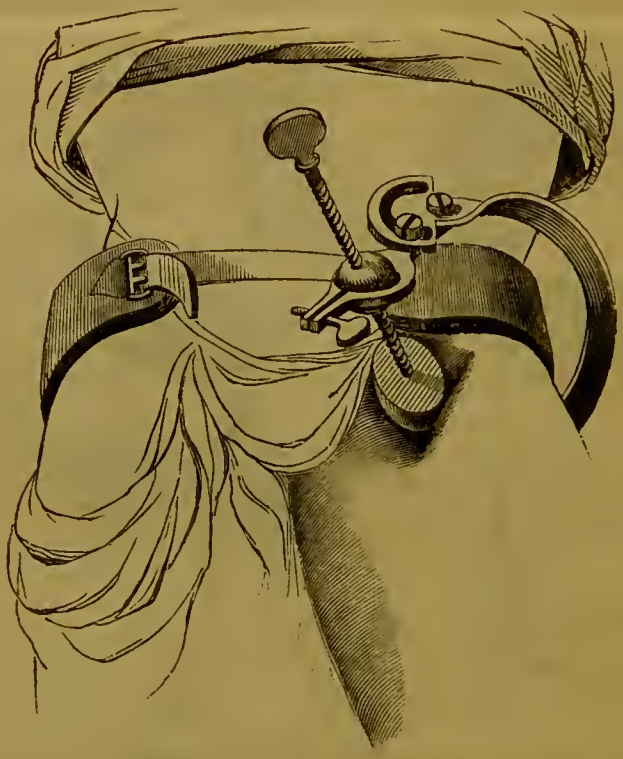
independent of the disturbance incidental to every change of posture of the thigh, while it allows us to avail ourselves of one of the most valuable of the *auxiliaries* to compression, namely, an elevated position of the limb, favouring the return of the venous blood.

The annexed sketches will, perhaps, render the construction and mode of application of the apparatus more intelligible.

In the foregoing wood-cut—A, is the band, consisting of a thin iron plate, covered with leather, and well padded on its concave side; B, a notch in the band, which prevents the latter from coming in contact with the spine of the sacrum; C, a semicircular steel arm attached to the back of the pelvic band, and capable of being adjusted to the right or left side as the case may require; D, a quadrant by means of which the screw portion can be moved in different directions; E, a ball and ring joint; the ring can be made to grasp the ball by means of a screw; F, a thumb-screw for closing the ring.

When the pelvic apparatus was first made, it was found to irritate the skin covering the spine of the sacrum, as the patient lay constantly on his back; the notch marked B was then made, and all pressure on the spine thus completely avoided.

In the following sketch the limb is represented with the instrument in its place. The pad is directed upwards and backwards towards the pubis.



A few remarks may now be made on the auxiliaries to compression.

AUXILIARIES TO COMPRESSION.

Bandaging.—General and moderate compression of the entire limb by a light bandage has been proposed as auxiliary to compression, in the hope of lessening the turgescence which has been generally remarked. I have not employed this expedient, because I could not believe it to be proper to oppose any restraint to the circulation through new and collateral arteries; and, secondly, because if it was intended

to obviate the venous congestion, it does not apply itself to its cause. And this congestion may be more effectually modified by *position*, or may be altogether prevented by the plan of avoiding the vein, already described.

Position—as an auxiliary, is not, I believe, alluded to in communications on this subject. I have reason to think that a moderate elevation of the foot was useful in the cases in which I employed it. If the artery be compressed against the pubis, it is easily accomplished, for in that case a varying position of the limb has little or no disturbing influence on the instrument. Every thing which favours the return of the venous blood would appear calculated to encourage the collateral circulation, by keeping the capillaries always in a fit state to receive a new supply.

Galvanism—by acupuncture has been proposed as an auxiliary to compression. I cannot recommend this agent: first, because I believe it is *not safe*, and, secondly, because I believe it is *not necessary*. It is not safe, since erysipelas has followed, and has even proved fatal. Erysipelas may, it is true, follow any punctured wound, or any wound, in an unhealthy constitution; but this would be no defence of the method, unless it could be shown that a cure was impossible without it. And when we consider that a galvanic current is made to pass through the puncture in this case, and that the constitution is, in a large proportion of aneurismal patients, unhealthy, we should be slow to adopt a measure of this kind. It is *not necessary*, because, even when the pressure was made low down in the thigh, and with an imperfect instrument, perseverance always effected a cure, without compromising the safety of the patient.

There is an auxiliary to which I have but slightly adverted, but which I employed on several occasions in Delany's case, and, I am persuaded, with advantage. This is a *momentary compression* with the fingers, at a point below the aneurismal sac, and just before the instant when the screw above is about to be tightened. I was led to adopt

this plan from the consideration, that although the artery was firmly compressed, and the current stopped, there was really not material for a large clot in the sac, and consequently very little addition was made to its solid contents. It occurred to me that by interrupting the current for a moment by pressure below the sac, and then preventing the current from above, that the sac would be at the same time full of blood, and in the desired state of repose. I believe it contributed something to the speedy solidification which occurred in Delany's case, and I therefore suggest its adoption to others for their consideration.

It is, I trust, unnecessary to argue the comparative merits of the methods by ligature and by compression. The treatment by compression may be now considered as established; there is no other mode under which so many cures have followed each other in uninterrupted succession; there is no other which for its safety equally deserves to be pressed upon the attention of the profession. The operation of John Hunter had a long day of dominion, if not of success; and none of the scientific foundations of that great master of British surgery have been more lauded in systematic works. In the absence of a safer mode, and compared with those which preceded it, Hunter's operation was entitled to a high place among the improvements of his time. But, strange as it may appear, there was no operation which the practitioner, impressed with a due regard for human life, approached with more reserve. It was liable to accidents from inexperience, but it was also surrounded by dangers which neither skill nor caution could avoid. It required experience to estimate the peril, for the statistics of the operation were defective, and afforded little aid to the beginner. Our periodicals were enriched with the details of successful cases, while the rate of mortality was an unknown quantity. The deaths were only whispered in conversation, while the recoveries were recorded in triumph. The man of experience knew all this, and his reserve increased

with his experience. He knew that secondary hæmorrage was of frequent occurrence, that phlebitis had its victims; and that death occasionally took place from gangrene or suppurative inflammation. No wonder, then, that the advent of a new principle of treatment, exempt from dangers such as these, should be welcomed by the cultivators of rational medicine; and it is in this spirit that it has been especially adopted by the professors of the healing art in this country.

APPENDIX.

Extract from a letter written by Dr. O'Brien, in reply to a note requesting him to re-state the appearance of the vein in the dissection made by that gentleman. The pressure had been applied on both limbs, both being affected with aneurism :—

"H. M. S. Birkenhead,
"Sheerness, 8th Jan., 1847.

"For about three inches, commencing from the ramus of the pubis, was *white*, *thick*, and *patulous*, so that when I first saw it, I mistook it for the artery. Its coats, on closer examination, had a ligamentous appearance. That was the one on the left side, the right was similar in appearance, but less marked. I believe the left was the last cured."

"W. J. O'BRIEN."